SWALLOW SCHOOL DISTRICT CURRICULUM GUIDE	
Curriculum Area: Science	**Course Length**: Full Year
Grade: 4th Grade	**Date Last Approved:** **Reviewed:**

Stage 1: Desired Results

Course Description and Purpose: In fourth-grade science, there are four units of study 2 Full Option Science System (Foss) units and two Project Lead the Way (PLTW) units. In the first unit, *Input/Output Computer Systems* where students study how technology works through programming by making a connection to the human brain and nervous system. In the 2nd unit students study *Environments* learning about living and nonliving things and how they interact with the world. For the 3rd students learn about energy in the Energy Exploration unit. In our final unit, *Soil, Rock, and Landforms,* students study rocks, minerals, and their composition.

Enduring Understanding(s):

- Analyze maps to describe patterns of Earth's features.
- Learn that the environment includes both living and nonliving things, such as soil, water, plants, and animals.
- Learn that plants and animals have internal and external structures that support their survival, growth, and behavior, and
- learn how plants and animals adapt to their surroundings.
- Rocks and minerals are valuable natural resources that are useful based on their individual properties.
- Rocks and minerals are constantly being recycled and reformed through the processes of the rock cycle.
- The many minerals are the building blocks for all inorganic materials that make up the Earth.
- The characteristics of rocks and minerals present on Earth today provide clues to the geological history of our planet.
- Computers are systems of inputs, outputs, and processors that can perform many tasks very quickly.
- The display on a digital screen corresponds to an x-y coordinate system.
- Computer programs do not need to be right the first time. Testing and fixing things is normal when programming.
- Energy can be transferred in various ways and between objects.
- Engineers improve existing technologies or develop new ones to increase their benefits, to decrease known risks, and to meet societal demands
- Cause and effect relationships are routinely identified, tested, and used to explain change.

Essential Question(s):

- What are the different forms of energy? (e.g., light, heat, sound, electrical, mechanical)
- What are examples of energy sources in our environment?
- How can we conserve energy and use it efficiently?
- What are the impacts of different energy sources on the environment?
- How can we design systems to harness and transfer energy effectively?
- How do materials cycle through the Earth’s systems?
- Something about cycles or geologic time or relationships.
- How are properties used to identify, sort, and classify rocks and minerals?
- What kind of simple tools are used to help determine the properties and how are the tools used?
- How does acid rain affect rocks that contain calcite?
- What kinds of rocks would be a good choice for building materials? Why?
- How does a computer system work?
- How do humans translate a problem so that a computer can operate on it?
- What are the advantages that technology offers to humans that allow us to accomplish things we couldn’t do without technology?
- In what ways do animals and plants interact with their environment and with each other?
- How do the structures of an organism allow it to survive in its environment?
- What impacts the preferred environments, range of tolerance, and optimum conditions for the growth and survival of specific organisms, both terrestrial and aquatic?

Learning Targets: 1. Students can apply the scientific process to evaluate investigations or the design process to create design solutions to solve a problem. (Skill/Product) 2. Students can organize and communicate information. (Skill) 3. Students can develop and interpret models. (Skill/Product) 4. Students can support a claim with evidence. (Skill/Product/Reasoning)	

Stage 2: Learning Plan

I. Launch Input/Output Computer Systems

A. Input, Processing and Output
B. Information Highway
C. Data Collection and Display

Standards Referenced:

3-5-ETS1-1
3-5-ETS1-2
3-5-ETS1-3

Learning Targets Addressed:

Science Target 1
Science Target 3
Science Target 4
RLA Target 2

Key Resources Used:

- PLTW
- Tynker

Assessment Map:

Type	Level	Assessment Detail
Practice	Knowledge	● Explain why computer scientists break big problems into subproblems. ● Identify parts of a computational solution that can be abstracted and modularized in order to make the solution efficient and generalizable. ● Identify basic input and output devices in computer systems. ● Give examples of real-life applications of computer systems.
Formative	Skills/ Reasoning	● Decompose a problem and use a predefined set of commands to write an algorithm that will solve the problem. ● Demonstrate the correct use of the x-y coordinate system when manipulating object positions and movement on a screen during an animated solution ● Use variables appropriately as part of a computational solution to store and manipulate values that may change as the program runs ● Implement a loop when appropriate to make a program repeat a section of code until an ending condition is reached. ● Use a conditional statement in a

		program as a true/false test to make the program follow a specified sequence of steps depending on the state of the condition. ● Program characters in an animation or game to respond to event triggers.
Summative	Product	● Program characters in an animation game to respond to event triggers. ● Create a video/blog about the human brain and how it reacts to outside stimuli.

II. Energy Exploration:

A. Solar Energy
B. Overview of energy sources and applications.

Standards: PS3.A Definitions of Energy, PS3.B Conservation of Energy and Energy Transfer, PS3.C Relationship Between Energy and Forces, PS3.D Energy in Chemical Processes and Everyday Life, ETS1.A Defining and Delimiting Engineering Problems, ETS1.B Developing Possible Solutions, ETS1.B Developing Possible Solutions, ETS1.C Optimizing the Design Solution

Learning Targets Addressed:

Science Target 1
Science Target 3
Science Target 4
RLA Target 2

Key Resources Used:

- PLTW Launch

Assessment Map:

Type	Level	Assessment Detail
Practice	Knowledge	● Vocabulary derived from nonfiction reading and other materials to gain knowledge about a topic. ● State questions that engineers may ask when gathering information about a situation people want to change. ● List ways in which energy is or can be transferred
Formative	Skills/ Reasoning	● Provide evidence that energy can be transferred from place to place.

			• Plan and perform fair tests in which variables are controlled to identify a product's strengths and limitations. • Generate multiple solutions to a design problem while taking into account criteria and constraints.
	Summative	Product	• Design a project plan on energy for a city plan.

III. Soils, Rocks and Landforms

A. Schoolyard Rock
B. Mineral Hardness
C. Other Mineral Properties
D. Minerals in Granite

Standards: 4-ESS1-1, 4-ESS2-1

Learning Targets Addressed:

Science Target 1
Science Target 3
Science Target 4
RLA Target 2

Key Resources Used:

- FOSS

Assessment Map:

Type	Level	Assessment Detail
Practice	Knowledge	• Earth is mainly made of rock. • Rocks on the earth's surface are constantly being broken down into smaller and smaller pieces, from mountains to boulders, stones, pebbles and small particles that make up soil. • Rocks can be sorted based on properties, such as shape, size, color, weight or texture. • Properties of rocks can be used to identify the conditions under which they were formed. • Igneous rocks are formed when melted rock cools, hardens and forms crystals. Melted rock that cools slowly inside a volcano forms large crystals as it cools. Melted rock that cools rapidly on the earth's surface forms small crystals (or none at all). • Sedimentary rocks are formed underwater when small particles of sand, mud, silt or ancient shells/skeletons settle to the bottom in layers that are buried and cemented together over a long period of time. They often have visible layers or fossils. • Metamorphic rocks are formed when igneous or sedimentary rocks are reheated and cooled or pressed into new forms. They often have bands, streaks or clumps of materials. • Rock properties make them

		useful for different purposes. Rocks that can be cut into regular shapes are useful for buildings and statues; rocks that crumble easily are useful for making mixtures such as concrete and sheetrock. ● All rocks are made of materials called minerals that have properties that may be identified by testing. ● Mineral properties include color, odor, streak, luster, hardness and magnetism. ● Minerals are used in many ways, depending on their properties. For example, gold is a mineral that is easily shaped to make jewelry; talc is a mineral that breaks into tiny grains useful for making powders.
Formative	Skills/ Reasoning	● Teacher observations ● Rock information organizer for each type of rock – igneous, sedimentary, and metamorphic ● Maintain responses to investigations and discussions in student's science notebook ● Mock Rocks Response Sheet ● Scratch Test Response Sheet ● Mineral Properties Response Sheet ● Calcite Quest Response Sheet ● Performance Assessment Scratch Test ● Performance Assessment Vinegar Test
Summative	Product	● Rocks and Minerals Unit Assessment ● Constructed Response- What are the three types of rocks and how are they formed? ● Constructed Response- Describe the process in which earth materials change. ● Constructed Response- Draw conclusions and defend the best uses for several (3 or more) rock properties. ● Differentiate between rocks and minerals. ○ Use the senses and simple measuring tools to gather

			data about various rocks and classify them based on observable properties (e.g., shape, size, color, weight, visible markings). ● Conduct simple tests to determine properties of different minerals (e.g., color, odor, streak, luster, hardness, magnetism), organize data in a table, and use the data and other resources to identify unknown mineral specimens. ● Summarize nonfiction text to compare and contrast the conditions under which igneous, metamorphic and sedimentary rocks are formed. ● Observe and analyze rock properties (e.g., crystal size or layers) to infer the conditions under which the rock was formed. ● Evaluate the usefulness of different rock types for specific applications (e.g., construction, countertops, statues or monuments).